

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
27 January 2005 (27.01.2005)

PCT

(10) International Publication Number  
**WO 2005/008583 A3**

(51) International Patent Classification<sup>7</sup>: G06T 7/20, 11/00

[IL/IL]; 9 Oranim Street, 54052 Givat Shmuel (IL).  
KLAIMAN, Moshe [IL/IL]; 21/2 Harava Street, 70700  
Gedera (IL).

(21) International Application Number:

PCT/IL2004/000632

(74) Agent: REINHOLD COHN AND PARTNERS; P.O.  
Box 4060, 61040 Tel Aviv (IL).

(22) International Filing Date: 14 July 2004 (14.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/488,382 21 July 2003 (21.07.2003) US

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.

(71) Applicant (for all designated States except US): PAIEON  
INC. [US/US]; 747 3rd Avenue, New York, New York  
10017-2803 (US).

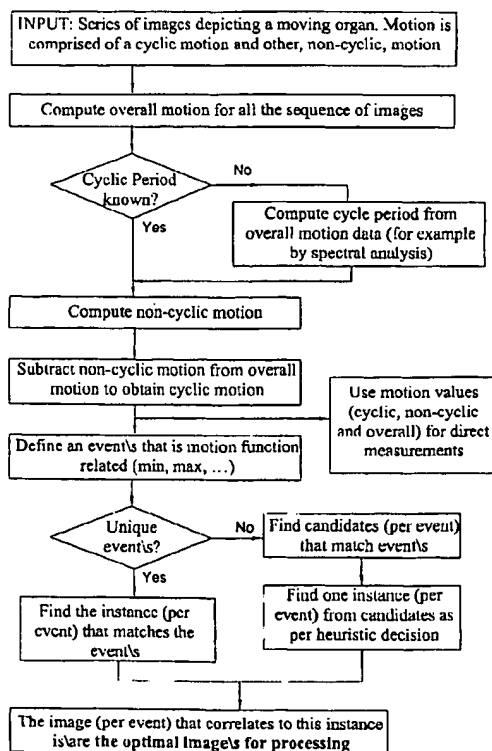
(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,

(72) Inventors; and

(75) Inventors/Applicants (for US only): ZARKH, Michael

[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR IDENTIFYING AN OPTIMAL IMAGE WITHIN A SERIES OF IMAGES THAT  
DEPICT A MOVING ORGAN



(57) Abstract: A method and system for quantifying a cyclic motion within a series of images depicting a moving object subject to composite motion containing a cyclic component and a non-cyclic component of lower frequency than the cyclic component. Composite motion is computed. The non-cyclic component is computed as the integral of motion over a motion cycle. The non-cyclic component is subtracted from the composite motion so as to obtain the cyclic component.

WO 2005/008583 A3



ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:  
17 March 2005

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IL2004/000632

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-23

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-23

processing a series of images depicting a moving object  
subject to composite motion for extracting a cyclic motion  
component;

---

2. claims: 24-28

analysis of a graphical representation of a cyclic motion  
for identifying those images in a series of images that  
depict an event associated with cyclic motion of a moving  
object;

---

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IL2004/000632

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G06T7/20 G06T11/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 G06T G01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)  
EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX, IBM-TDB, BIOSIS, EMBASE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 885 594 A (MEDINOL LTD) 23 December 1998 (1998-12-23)	1,2, 5-10,12, 13,16-23
A	abstract page 2, line 42 - line 50  page 4, line 20 - page 5, line 23 page 7, line 30 - line 45 page 10, line 38 - line 44 page 13, line 22 - page 15, line 14 figures 2,9  ----- -/--	3,4,11, 14,15

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the International filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

30 September 2004

Date of mailing of the international search report

31 01. 2005

Name and mailing address of the ISA  
European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax (+31-70) 340-3016

Authorized officer

Engels, A

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IL2004/000632

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>NELSON T R ET AL: "Three-dimensional ultrasound imaging" ULTRASOUND IN MEDICINE AND BIOLOGY, NEW YORK, NY, US, vol. 24, no. 9, December 1998 (1998-12), pages 1243-1270, XP004295279 ISSN: 0301-5629 chapters "Physiological Synchronization", "Clinical Applications - Cardiology" -----</p>	5-10,12, 16-22
A	<p>BANKMAN I: "Handbook of Medical Imaging - Processing and Analysis" 2000, ACADEMIC PRESS, SAN DIEGO, LONDON , XP002298756 Ratib O: "Quantitative Analysis of Cardiac Function" page 359 - page 374 in particular chapters 1, 2, 3 -----</p>	5-10,12, 16-22

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IL2004/000632

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0885594	A	23-12-1998	US 5924990 A	20-07-1999
			AT 283497 T	15-12-2004
			AT 236574 T	15-04-2003
			AU 757314 B2	13-02-2003
			AU 7307498 A	14-01-1999
			AU 8032298 A	04-01-1999
			BR 9814778 A	26-06-2001
			CA 2240651 A1	19-12-1998
			CZ 9801901 A3	13-10-1999
			DE 19827460 A1	24-12-1998
			DE 69813087 D1	15-05-2003
			DE 69813087 T2	05-02-2004
			DE 69827857 D1	30-12-2004
			DK 885594 T3	14-07-2003
			EE 9800196 A	15-02-1999
			EP 1227342 A1	31-07-2002
			EP 0885594 A2	23-12-1998
			ES 2192290 T3	01-10-2003
			GB 2326479 A , B	23-12-1998
			WO 9857580 A1	23-12-1998
			IL 125000 A	12-05-2004
			JP 11151246 A	08-06-1999
			NO 982817 A	21-12-1998
			PL 326831 A1	21-12-1998
			PT 885594 T	29-08-2003
			RU 2238041 C2	20-10-2004
			SG 68672 A1	16-11-1999
			SK 87098 A3	14-02-2000
			US 6152878 A	28-11-2000
			US 6095976 A	01-08-2000